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Abstract

Many theoretical models show that redistribution causes low growth. However, cross-country regressions often suggest that growth is positively related to redistribution. This paper analyzes that puzzle in an open economy framework. Among other things it is shown that tax competition and the danger of capital outflows leads optimizing, redistributing governments to pursue high growth, no redistribution policies in technologically similar economies. However, if a redistributing government's economy is technologically superior, it is shown that it may attract foreign owned capital, have relatively higher GDP growth and may redistribute. Both results imply that in a cross-section of countries one would observe a positive association between growth and redistributive transfers.

KEYWORDS: Growth; Redistribution; Tax Competition; Capital Mobility

JEL Classification: O4, H21, D33, C72, C21, F21

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1 Introduction

In policy discussions and in the theoretical literature it is often argued that high redistributive taxes cause capital outflows and low growth. For instance, Alesina and Rodrik (1994) and others have shown that political objectives leading to policies favouring the non-accumulated factor of production (e.g. labour) imply low growth in closed economies. However, researchers are often surprised to find that redistributive transfers are significantly positively related to growth in cross-country growth regressions. See, for instance, Perotti (1994) or Sala-i-Martin (1996).

This paper offers an explanation of the puzzle. It is shown that redistributing governments which face high capital mobility or which attempt to stop capital outflows before tackling distributional issues will pursue policies that are indistinguishable from, that is, observationally equivalent to high growth policies. This holds in an environment where foreign governments might benefit from the outflow of domestically owned capital and if the economies involved are technologically similar. If a redistributing government's economy is technologically superior, it is shown that it may attract foreign owned capital, have relatively higher growth and may redistribute resources to the non-accumulated factor of production. Both results imply that in a cross-section of countries one would observe that growth correlates positively with redistributive transfers.

Suppose the government faced the redistribution-capital-outflow-low-growth problem and that stopping capital outflows was good for growth. Then in a world, in which capital was - perhaps only weakly - mobile, it might deal with the problem in two reasonable ways. First, the government could act sequentially. It might prefer not to tolerate capital outflows at all. After having secured the maximum possible size of the capital stock, it might then, and only if feasible, redistribute capital. Second, it could solve the problem simultaneously. It might strictly prefer to redistribute at the expense of losing some capital. In this paper the sequential solution method is referred to as the New Left approach (NL) and the simultaneous solution as the Old Left approach (OL).

come recipients. In the paper the governments adopt the source principle for the taxation of internationally mobile wealth.[5] Furthermore, the investors can costlessly shift their assets to the country offering the highest return on capital.

For given policies the open economy market equilibrium is characterized by balanced growth and the return on capital is always equal across countries. That is what one would expect in a highly integrated world where investors can costlessly shift capital. However, depending on the public policy the level of GDP may be very different across countries. If capital flight occurs, a country may loose its entire productive capital stock so that no GDP is generated and the workers 'starve'. These stylized features of the model serve to bring out sharply the long-run effects, capital flight may have for an economy.

The governments of otherwise identical economies are taken to engage in tax competition.[6] A right-wing government wants to maximize the domestic capital owners' income and does not care about the domestically installed capital stock. In contrast, a left-wing government wants a high level and growth of GDP, because wages and redistribution depend positively on the overall capital stock. Therefore, the left-wing government does everything to prevent capital flight. It wishes to attract ('grab') as much domestically or foreign owned capital as possible.

For similar, that is, equally efficient economies I show that in equilibrium there is no room for redistribution. Thus, even two left-wing governments do not redistribute in the optimum. The intuition for the result is the following: For redistribution a left-wing government has to set high taxes, which imply a low return to capital, inducing capital flight. The resulting decrease in welfare is so high that a left-wing government is better off if it does not redistribute. Compensation is given by stopping any capital relocation and securing high enough wages.

[5]This may be justified by the observation that in a non-cooperative environment with very high capital mobility, and absent any problems arising from transfer pricing, governments may not be able to monitor their residents' wealth perfectly.

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abroad, there are more resources for redistribution and the level of GDP and its growth are higher when capital mobility is very high than under the optimal left-wing policy in a closed economy. Clearly, the capital relocation effect is highest when capital mobility is perfect. For these reasons an efficient economy's left-wing government would want very high capital mobility. Furthermore, it would generally have a relatively stronger interest in innovation (superior technology) than a right-wing government as that enlarges redistributive freedom.

To generalize the results suppose capital mobility was not perfect. Then in a market equilibrium the returns to capital would not be the same across countries for given policy. For similar countries the tax competition equilibria would all be unique because of the costs to capital relocations or due to a NL policy, which strictly attempts to prevent capital outflows. Furthermore, in a technologically superior economy the policies would be qualitatively the same if the government was OL and perfect capital mobility prevailed or was NL and capital mobility was imperfect. Thus, all the essential qualitative results would hold if there was imperfect capital mobility and the government pursued a NL policy. From this I conclude the following:

A *hypothetical* comparison of possible matches of public policies implies that a right-wing policy is always growth maximizing in the model. An efficient economy's left-wing policy does not necessarily maximize growth, but it induces capital flight (outflow) for an inefficient economy's opponent. Thus, *hypothetically* distributing resources towards labour may be bad for notional, maximum growth.

However, in terms of *observable* comparisons, either an optimizing, left-wing government chooses the growth maximizing tax rate in similar countries against any opponent or it has a more efficient economy, distributes resources towards labour *and* has a higher observed GDP growth than its opponent, no matter whether right or left-wing. But then redistributive transfers should correlate positively with growth in cross-country growth regressions.

Thus, the paper's main insights are the following: In the model optimizing governments do not find it optimal to tolerate capital outflows abroad, there are more resources for redistribution and the level of GDP and its growth are higher when capital mobility is very high than under the optimal left-wing policy in a closed economy. Clearly, the capital relocation effect is highest when capital mobility is perfect. For these reasons an efficient economy's left-wing government would want very high capital mobility. Furthermore, it would generally have a relatively stronger interest in innovation (superior technology) than a right-wing government as that enlarges redistributive freedom.

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$\alpha \in (0,1)$ and Y_t is output produced in the home country. K_t is an index of the domestically productive capital stock, and k_t (k_t^*) is the (broad) capital stock, including disembodied technological knowledge, owned by domestic (foreign) capitalists and G_t are public inputs to production.[9] Furthermore, $L_t = 1$, so that labour is supplied inelastically. The foreign country has the same technology and technological differences are due to A, which is an efficiency index, reflecting cultural, institutional and technological development. If both countries are equally efficient ($A = A^*$) the economies are called *similar*, because they may well be different in terms of institutional or cultural development. If $A \neq A^*$ the economies are called *different*.

The variable ω_t denotes the fraction of real capital at date t owned by domestic capitalists allocated to the home country. The rest is located abroad. The model allows for the case that all of the domestically owned capital is located abroad by assuming $\omega_t \in [0,1]$. That serves to bring out sharply any effects, capital flight may have for an economy.[10] Throughout the analysis I abstract from problems arising from depreciation of the capital stock.

The Public Sector. In both countries wealth is taxed and redistributed at constant rates. The governments adopt the source principle for wealth taxation. The domestic tax rate τ is levied on domestic wealth $\omega_t k_t$ and foreign wealth $(1-\omega_t^*)k_t^*$. Analogous definitions hold for the foreign country.[11] The government faces the following balanced budget constraint

$$\tau K_t = G_t + \lambda \tau K_t \tag{2}$$

[9]For growth models which interpret knowledge as just another capital good used in production see Frankel (1962) or Romer (1986). For an up-to-date discussion of these models see, for instance, Aghion and Howitt (1998).

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$$\max_{C_t^k,\omega_t} \int_0^\infty \ln C_t^k \, e^{-\rho t} dt \tag{6}$$

$$\text{s.t.} \quad \dot{k}_t = (r-\tau)\omega_t k_t + (r^*-\tau^*)(1-\omega_t)k_t - C_t^k \,, \tag{7}$$

$$0 \leq \omega_t \leq 1 \,, \tag{8}$$

$$k(0) = \overline{k_0}, \quad k(\infty) = \text{free.} \tag{9}$$

Equation (7) is the dynamic budget constraint of the capitalists who earn $r\omega_t k_t$ income at home and $r^*(1-\omega_t)k_t$ income abroad. The necessary first order conditions for the problem are given by equations (7), (8), (9) and

$$U' - \mu_t = 0 \tag{10a}$$

$$\mu_t(r-\tau)k_t - \mu_t(r^*-\tau^*)k_t = 0 \tag{10b}$$

$$\dot{\mu}_t = \mu_t\rho - \mu_t\left[(r-\tau)\omega_t + (r^*-\tau^*)(1-\omega_t)\right] \tag{10c}$$

$$\lim_{t\to\infty} k_t\mu_t e^{-\rho t} = 0. \tag{10d}$$

where μ_t is a positive co-state variable representing the instantaneous shadow price of one more unit of investment at date t. Equation (10a) equates the marginal utility of consumption to the shadow price of more investment, (10c) is the standard Euler equation which relates the costs of foregone investment (LHS) to the discounted gain in marginal utility (RHS) and (10d) is the transversality condition for the capital stock which ensures that the present value of the capital stock approaches zero asymptotically. Equation (10b) describes the capital allocation decision, which takes a 'bang-bang' form and is given by

$$\omega_t = \begin{cases} 1 & : \quad (r-\tau) > (r^*-\tau^*) \\ \in [0,1] & : \quad (r-\tau) = (r^*-\tau^*) \\ 0 & : \quad (r-\tau) < (r^*-\tau^*)\,. \end{cases} \tag{11}$$

The capitalists' allocation decision is extreme in that they immediately shift their assets (capital) to the country where the after-tax return on capital is higher. Thus, relative to any planning horizon the speed of programme

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For the derivation of the *two-country market equilibrium* and given arbitrary tax rates concentrate on the domestic economy first. Divide (7) by k_t, and use the fact that in steady state γ_k is constant. Rearranging and taking time derivatives yields $\gamma = \gamma_k$ and constant. Also, substituting γ for γ_k in (7) establishes that $C_t^k = \rho k_t$ as the capitalists' instantaneous consumption in steady state. Hence, in the open economy the domestic capitalists' consumption grows at the same, constant rate as their capital stock. The total wealth of the domestic capitalists at any point in time is k_t and the budget constraint satisfies equation (7). For given ω, ω^* the world resource constraint is given by

$$\dot{k}_t + \dot{k}_t^* = (r+\eta)K_t + (r^*+\eta^*)K_t^* - G_t - G_t^* - C_t^k - C_t^{k^*} - C_t^W - C_t^{W^*}$$

where $K_t = \omega k_t + (1-\omega^*)k_t^*$, $K_t^* = \omega^* k_t^* + (1-\omega)k_t$, $G_t = (1-\lambda)\tau K_t$ and $G_t^* = (1-\lambda^*)\tau^* K_t^*$ since the governments run balanced budgets. The production functions imply $Y_t = rK_t + \eta K_t$ and $Y_t^* = r^* K_t^* + \eta^* K_t^*$. From the private sector optimality and the steady state conditions the world resource constraint satisfies

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2.2 The Government

The domestic government maximizes the intertemporal utility of its national clientele. For simplicity, it is assumed to be either entirely pro-capital ('right-wing') or completely pro-capital ('left-wing').[15] The capital owners' welfare is

$$V^r = \frac{\ln(\rho k_0)}{\rho} + \frac{\gamma}{\rho^2}, \qquad \forall\, \omega, \omega^* \in [0,1]. \tag{16}$$

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which is not a proper function, since for given M the ω's may be indeterminate. Notice that V^l is increasing in γ and so in M. As M implicitly determines ω and ω^*, any left-wing policy must try to optimize M. Thus, a *left-wing* government would also try to maximize growth. More importantly, however, the left-wing government wants to secure a high capital stock as that raises wages and provides the basis for redistribution. It will want to avoid any situation that leads to capital flight. As the investors' capital allocation is extreme, one may say that for a given growth rate the left-wing government wants to *'grab'* capital.

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countries where full tax harmonization is not feasible. As a consequence governments may engage in tax competition. (For a similar point see, for instance, Sinn (1990) or Bovenberg (1994).) I model tax competition as a two-stage game and assume that the governments move simultaneously, but before the private sector. The strategies of the governments are the choices of taxes and redistribution. The governments and the private sector agents move simultaneously. Furthermore, both economies have the same initial capital stock $k_0 = k_0^*$, and are equally efficient, $A = A^*$, unless stated otherwise. Solving backwards requires a government to maximize (16) or (17) taking its opponent's choice of (τ^*, λ^*) as given. Thus, each government's problem is to choose taxes and redistribution so that

$$\tau, \lambda = argmax \left\{V^j; \text{given } \tau^*, \lambda^*\right\} \quad , \quad j = l, r.$$

The problem cannot be handled simply by differentiation of the objective function since V^j depends on γ and so M. Recall $M \equiv max(r-\tau, r^*-\tau^*)$ which is a continuous function, but not differentiable everywhere. I will now analyze each government's problem in turn.

3.1 Tax competition among similar economies

Consider the domestic, non-redistributing right-wing government. As the welfare measure V^r is increasing in γ and only the growth rate depends on taxes the right-wing governments' problem reduces to choosing τ such that

$$\tau = argmax \left\{M; \text{given } \tau^*, \lambda^*\right\}. \tag{20}$$

Thus, it wants to maximize M, given τ^*, λ^* and given the optimal, private sector ω and ω^*. Recall that $a(\tau) \equiv r - \tau$ and $b(\tau^*) \equiv r^* - \tau^*$, and notice that b is independent of τ. Then $M = max(a, b)$ and a is a continuous function of τ. But for given τ^* the function b is as well, because a constant countries where full tax harmonization is not feasible. As a consequence governments may engage in tax competition. (For a similar point see, for instance, Sinn (1990) or Bovenberg (1994).) I model tax competition as a two-stage game and assume that the governments move simultaneously, but before the private sector. The strategies of the governments are the choices of taxes and redistribution. The governments and the private sector agents move simultaneously. Furthermore, both economies have the same initial capital stock $k_0 = k_0^*$, and are equally efficient, $A = A^*$, unless stated otherwise. Solving backwards requires a government to maximize (16) or (17) taking its opponent's choice of (τ^*, λ^*) as given. Thus, each government's problem is to choose taxes and redistribution so that

$$\tau, \lambda = argmax \left\{ V^j ; \text{given } \tau^*, \lambda^* \right\} \quad , \quad j = l, r.$$

The problem cannot be handled simply by differentiation of the objective function since V^j depends on γ and so M. Recall $M \equiv max(r - \tau, r^* - \tau^*)$ which is a continuous function, but not differentiable everywhere. I will now analyze each government's problem in turn.

3.1 Tax competition among similar economies

Consider the domestic, non-redistributing right-wing government. As the welfare measure V^r is increasing in γ and only the growth rate depends on taxes the right-wing governments' problem reduces to choosing τ such that

$$\tau = argmax \left\{ M ; \text{given } \tau^*, \lambda^* \right\} . \tag{20}$$

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Assume $\lambda = \lambda^* = 0$ and suppose $\tau^* > \hat{\tau}$. From Figure 2 it is not difficult to see that if $\tau^* > \check{\tau}$ the domestic left-wing government sets $\tau = \check{\tau}$. If $\hat{\tau} < \tau^* \leq \check{\tau}$, it is optimal to set $\tau = \tau^* - \epsilon$, where ϵ is small. As $\tau^* \to \hat{\tau}$ the domestic left-wing government will definitely set $\tau = \hat{\tau}$. Thus,

Lemma 3 *In similar economies the best response of a domestic left-wing government against any foreign opponent is to choose*

$$\begin{array}{lll} (1) & \tau = \check{\tau} & \textit{if } \tau^* > \check{\tau} \\ (2) & \tau = \tau^* - \epsilon, & \textit{if } \hat{\tau} < \tau^* \leq \check{\tau} \\ (3) & \tau = \hat{\tau}, & \textit{if } \tau^* \to \hat{\tau}. \end{array}$$

Given the best response functions in similar economies the outcome of tax competition is as follows: For *two right-wing governments* and by symmetry of the problem Lemma 2 implies that there is an infinite number of Nash equilibria. That is due to the fact that if one player chooses $\hat{\tau}$ the other player is indifferent what to choose. Qualitatively, however, that makes sense because in a world with two right-wing governments the investors will never pay more or less than $\hat{\tau}$. In the Nash equilibrium the after-tax returns are equal so that capital flight may take place.

Proposition 1 *If two right-wing governments engage in tax competition in similar economies, there is an infinite number of Nash equilibria. The capitalists never pay more or less than $\hat{\tau}$ in either country. Capital flight is possible and there will be maximum GDP growth in at least one economy.*

An infinite number of equilibria may appear implausible at first sight. However, it has an important economic meaning in the model.[18]

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The objective of 'grabbing' capital prevents redistribution in equilibrium and is due to the left-wing government's fear of capital flight. Capital 'grabbing' and the right-wing objective of capital income maximization reduce the number of Nash equilibria to one. Thus, the objectives remove a source of indeterminacy, make capital flight quite unlikely and lead to equal GNP and GDP growth for both economies. That is so, because in equilibrium with $\tau = \tau^* = \hat{\tau}$, the after-tax returns will be equal and any ω, ω^* combination is possible. Thus, in contrast to the closed economy, a non-cooperative environment causes the left-wing government to mimic a growth maximizing policy. Importantly, the possibility of capital flight for the domestic economy is of measure zero. Hence, the workers are ex ante better off under left-right than under right-right tax competition. Proposition 1 implies that under right-right competition capital flight happens in one economy so that the workers in that country will 'starve'. As the capital allocation is indeterminate in an equilibrium with $\tau = \tau^* = \hat{\tau}$ (Proposition 2), the workers may be better off under *either* a right *or* a left-wing government. If the capitalists happen to shift more capital into the foreign right-wing government's economy, its workers will be better off than their domestic counterparts. That has the rather surprising implication that the workers may be better off under a right-wing government.

Corollary 1 *Under left-right tax competition in technologically similar economies ($A = A^*$), the workers may be better off under a right or a left-wing government.*

Economically, the results suggest that in highly integrated, technologically similar economies political preferences per se are not very important in determining growth or the well-being of a government's clientele.

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must hold. Furthermore, for redistribution $\tau > [(1-\alpha)A]^{\frac{1}{\alpha}}$. Thus,[19]

$$\begin{aligned} \tfrac{\alpha}{1-\alpha}\left([(1-\alpha)A]^{\frac{1}{\alpha}} - [\alpha(1-\alpha)A^*]^{\frac{1}{\alpha}}\right)\tau &> \tau\,[(1-\alpha)A]^{\frac{1}{\alpha}} \\ \Leftrightarrow \qquad \left(\frac{2\alpha-1}{\alpha}\right)^{\alpha}\frac{1}{\alpha} &> \frac{A^*}{A}. \end{aligned}$$

For $\alpha > \frac{2}{3}$ the LHS is smaller than 0.946. Letting $A = xA^*$, $x > 1$, the inequality holds if $x > 1.056$. Thus, in the model an efficiency advantage of, say, 6 percent is enough for a left-wing government to redistribute and to have higher GDP growth than its right-wing opponent.

Proposition 4 *A domestic left-wing government with a more efficient economy ($A > A^*$) sets taxes so that it gets all the capital ($\omega = 1, \omega^* = 0$), has higher GDP growth than its opponent ($\Gamma > \Gamma^* = 0$) and may redistribute. The capital income component of GNP grows at equal rates across countries ($\gamma = \gamma^*$). Furthermore, if it redistributes ($\lambda > 0$), the domestic agents are sufficiently impatient ($\rho > [(1-\alpha)A]^{\frac{1}{\alpha}}$), the domestic economy is relatively efficient ($A > \left(\frac{\alpha}{2\alpha-1}\right)^{\alpha}\alpha A^*$), and the share of (broad) capital is large ($\alpha > \frac{2}{3}$).*

Efficiency differences induce capital flight for an inefficient economy. Theoretically, an efficient economy's right-wing policy leads to a higher GDP growth rate than a left-wing policy, when competing with inefficient economies' governments. The efficient economy's left-wing government tries to get all the capital, but does not necessarily choose the growth maximizing tax rate. Thus, a *hypothetical* comparison of regimes when $A > A^*$ reveals that tax policies, favouring the non-accumulated factor of production might be bad for growth.

However, by Proposition 4 one may *observe* higher taxes favouring the non-accumulated factor of production *and* higher GDP growth than in another, less efficient economy with a right-wing government. Thus, in integrated economies it is well possible that an efficient economy's, left-wing government distributes towards labour and grows more than

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For tax competition among similar economies and no matter what distributional preferences a government has, the fear of capital flight leads to maximum growth of the capital income component of GNP in equilibrium and no redistribution takes place. That holds even though all governments might care about redistribution. The reason is that capital is good for redistributing governments. Capital flight reduces wages and the welfare loss incurred by a drop in wages outweighs the welfare gain derived from redistribution. However, political preferences do matter as regards GDP. Under right-right tax competition one economy will surely experience capital flight and its GDP will not grow. That constellation is bad for the workers. If a left-wing government competes against any opponent, no capital flight will take place. In that sense, (re-)distributive preferences are important for a country's non-accumulated factor of production.

If the countries are technologically different, more capital will locate in the efficient economy and it will have higher growth. If the efficient country's government wishes to redistribute, it may to do so without loosing any capital. The amount of redistribution depends on who the opponent is and on the efficiency gap that distinguishes it from its opponents.

From these arguments it follows that in cross-country growth regressions one would observe a positive association between growth and redistribution.

Furthermore, the paper argues that policies that make an economy more efficient are in the interest of both domestic workers and foreign as well as domestic capital owners. In comparison to other economies redistributive taxation does not necessarily cause slower growth if optimizing governments in an integrated world engage in tax competition and a redistributing government's economy is technologically superior.

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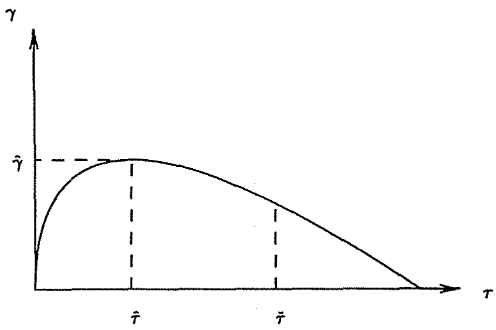

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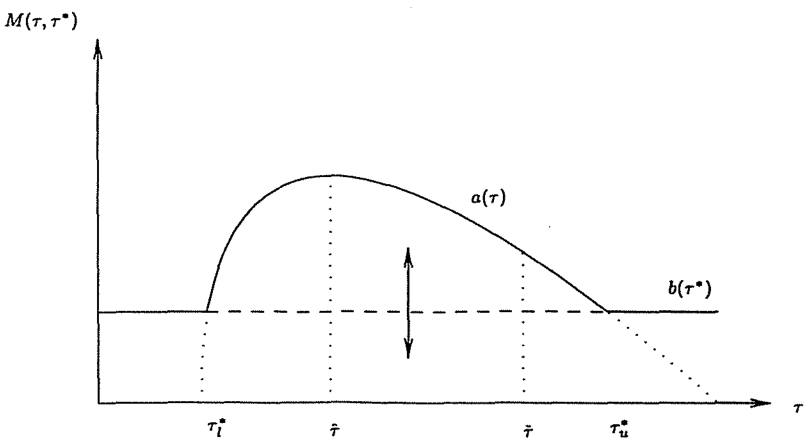

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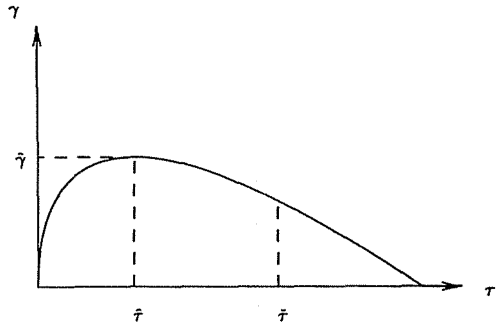

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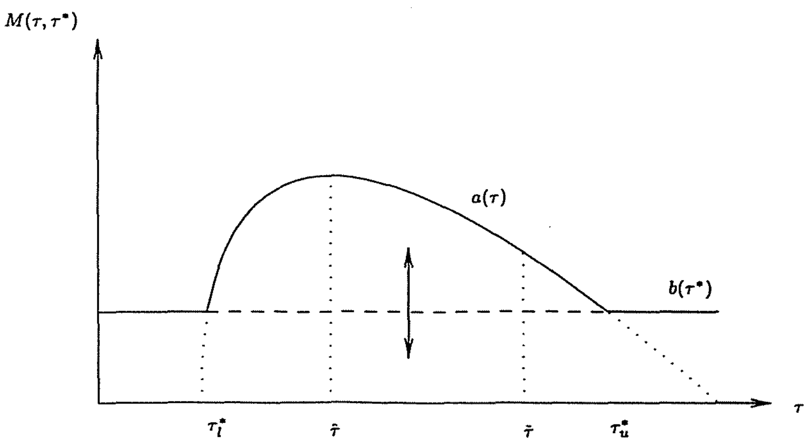

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